

# Central Montana Interoperable Communications Consortium

## Interoperable Communications Plan Needs Assessment

*Submitted By:*

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IT

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## 5.5.1 Alaska Bench

### Site Description:

This is a site in southern Fergus County identified during the technical committee meetings as a possible solution for the southern portion of the Snowy Mountains.

### Elevation:

6226'

### Latitude:

46°50'49.00"N

### Longitude:

109°15'25.00"W

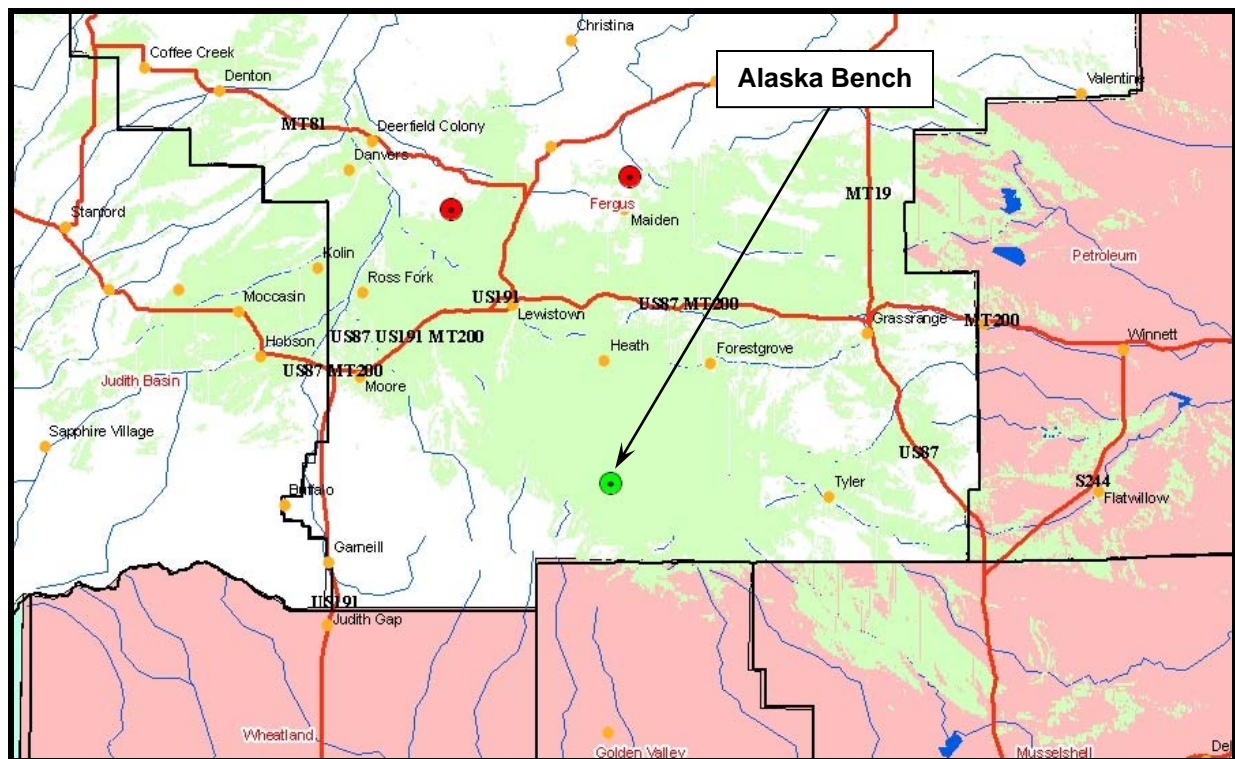


Figure 41 – Coverage Map: Alaska Bench

## 5.5.2 Black Eagle

### Site Description:

This site was identified as a potential brand new site in the Great Falls area to provide portable talking coverage for the city. It is located near the Black Eagle fire station and would provide excellent coverage over the north and west areas of Great Falls as well as mobile coverage in the surrounding area.

### Elevation:

3440'

### Latitude:

47°31'40.66"N

### Longitude:

111°16'29.64"W

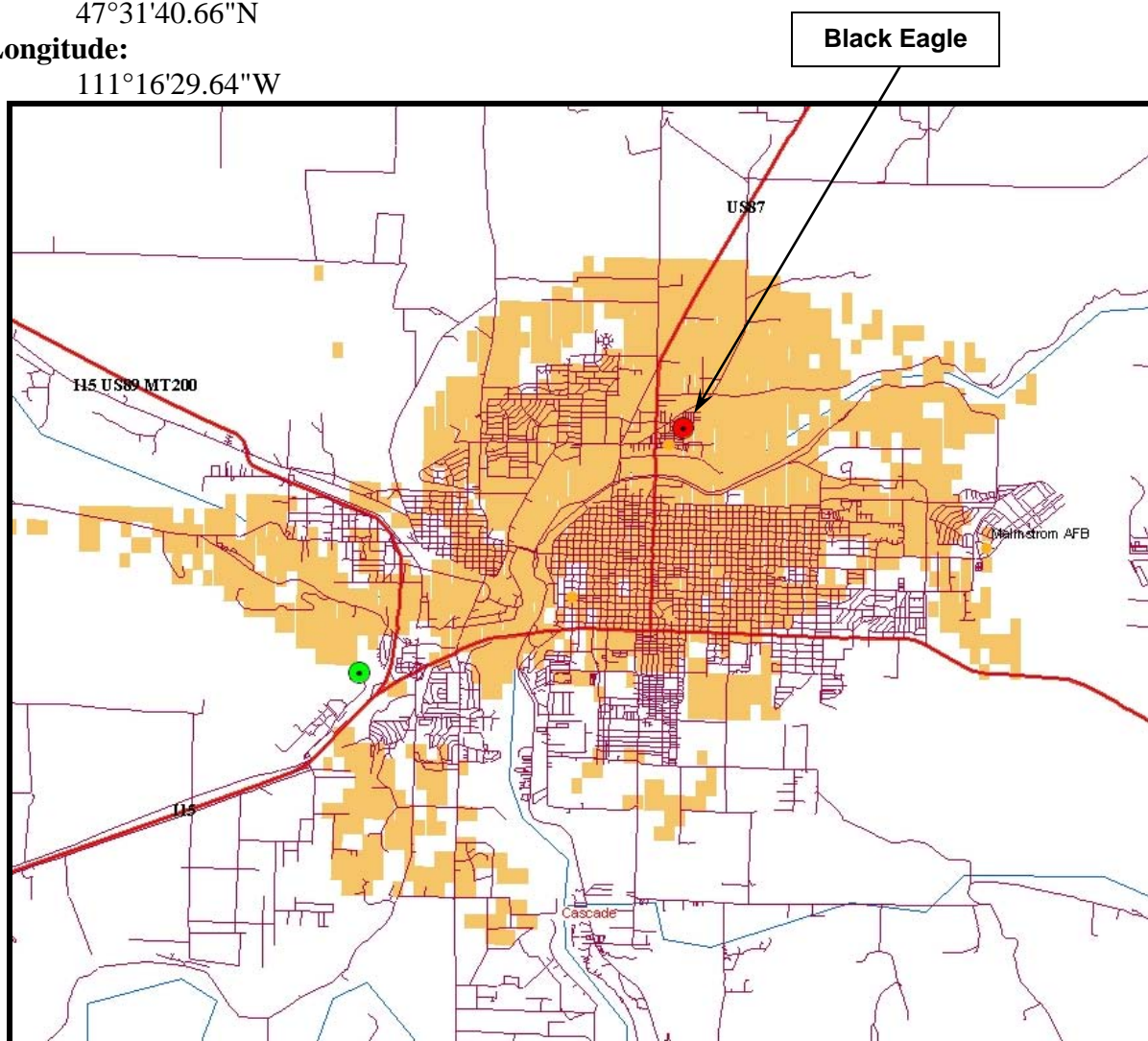


Figure 42 – Coverage Map: Black Eagle



### 5.5.3 Gore Hill - MHP

#### Site Description:

This site was another location identified during the technical committee meetings that may be able to provide portable coverage in the Great Falls area. After receiving the coverage maps, this site probably should not be considered in the coverage for Great Falls. However it is included in this section as a possible candidate for coverage in the area for mobiles.

#### Elevation:

3700'

#### Latitude:

47° 27' 30.8"

#### Longitude:

111° 23' 24.9"

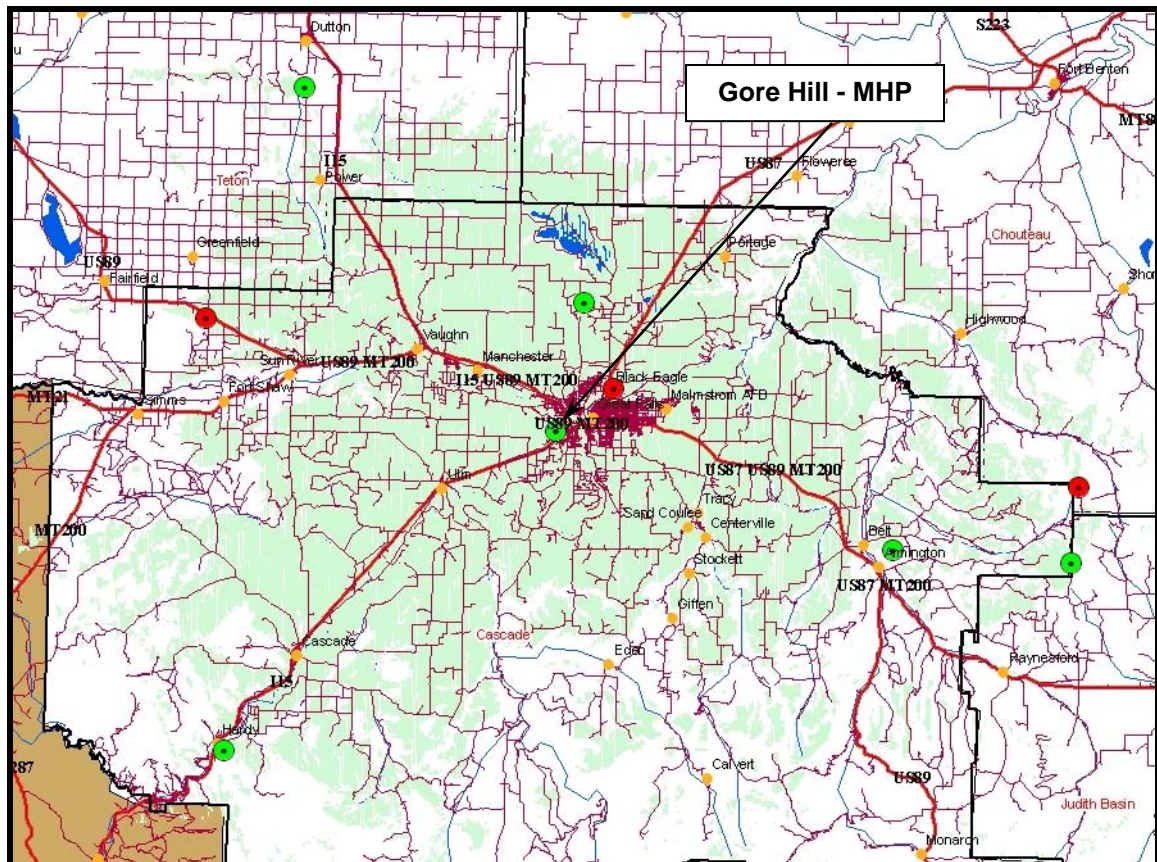


Figure 43 – Coverage Map: Gore Hill - MHP

#### 5.5.4 Shaw Butte

**Site Description:**

This site was identified during the technical committee meetings as an alternate site for Cascade West. It has good coverage in most of the areas that the West repeater has, but will need to be checked in detail to ensure that moving the site does not lose coverage from the West site.

**Elevation:**

4618'

**Latitude:**

47° 03' 33"

**Longitude:**

111° 50' 15"

**Coverage Map Not Available At Time of Printing**

**Figure 44 – Coverage Map: Shaw Butte**

### 5.5.5 South Peak Highwood Baldy

### Site Description:

This site was identified as a possible site to move the Raynesford repeater to increase its coverage. In looking at the Highwood Baldy site as well as other sites in the area, it may not be necessary to move the site or do any further upgrades. More engineering will need to be completed before moving forward with either Raynesford or South Peak.

**Elevation:**

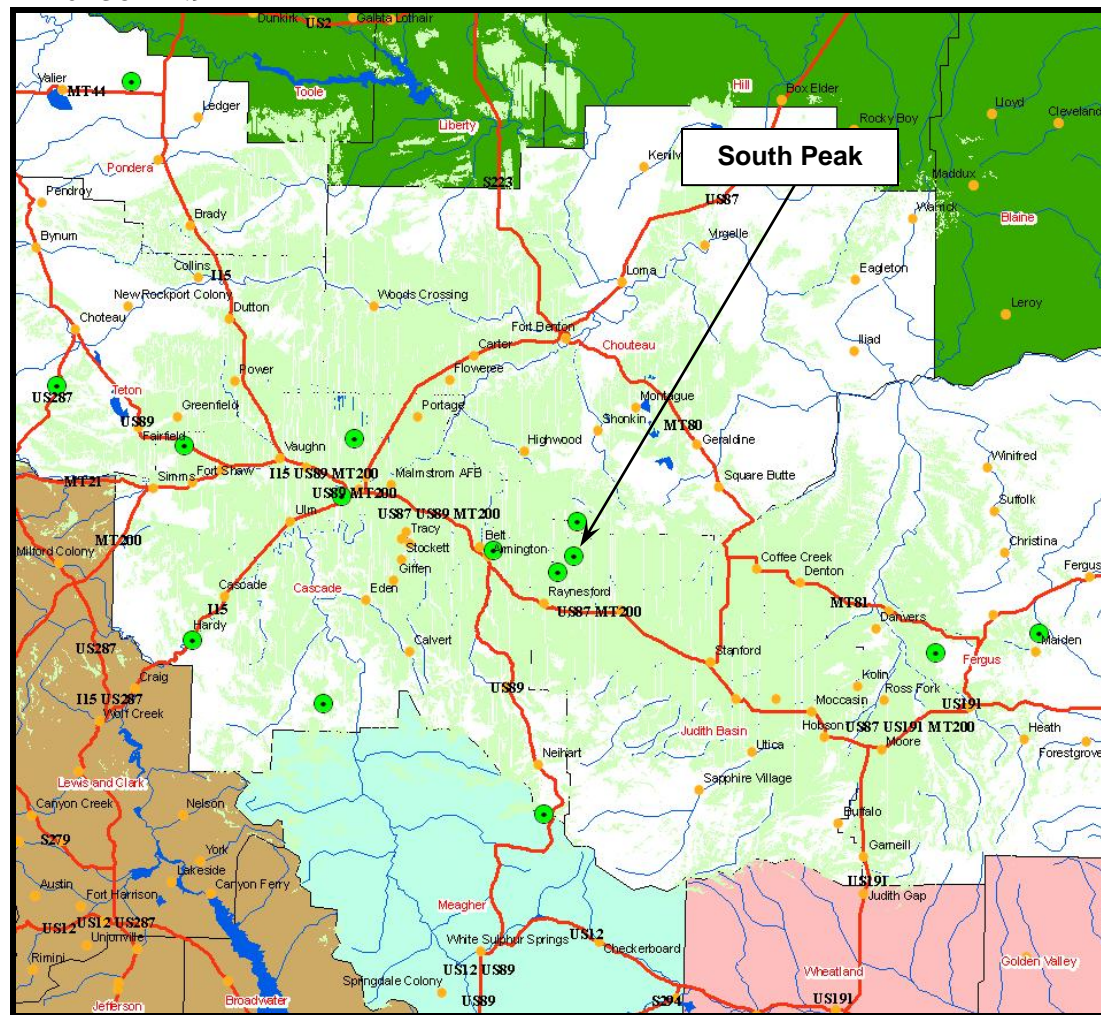
7073'

**Latitude:**

47° 22' 20.3"

**Longitude:**

110° 38' 21.9''



**Figure 45 – Coverage Map: South Peak Highwood Baldy**



## 5.6 Detailed Recommendations

As was described in the Executive Summary, the recommendations and strategy described in this document are intended to be in alignment with the SIEC definition of interoperable communication. The exact definition can be found on the document CD and at the following web site:

[http://www.discoveringmontana.com/itsd/policy/councils/SIEC/docs/SIEC\\_I\\_O\\_Def\\_tech\\_req.dot](http://www.discoveringmontana.com/itsd/policy/councils/SIEC/docs/SIEC_I_O_Def_tech_req.dot)

Overall project success depends on the ability to demonstrate success on an iterative basis throughout the life of the project. Project tracking and reporting to show where success has occurred will build support for the project. This includes not only stakeholder support, but also financial support.

Working collaboratively within the consortium and with other consortia/agencies throughout the state will bring about the most effective plan, design and implementation of a system. This will benefit not only the CMICC, but also other consortia and the state/region as a whole.

### 5.6.1 Funding and Resources

It is critical for the success of this project that additional funding and resources be identified and pursued. Funding is near the top of the list of concerns for every agency in the CMICC. It is important to look at resources that are available to contribute to the project, not just capital. There is a lot of focus on the one known revenue source.

At the time of this writing, the project has one primary revenue source: DES managed ODP Grants through Homeland Security. Additional funds or resources would allow the project to progress more quickly. The following are potential sources of funding:

- DPHHS - EMS
- Fire Grants
- National Guard
- Highway Traffic Safety
- Transportation (MDT)
- FEMA
- Legislature
- Congress

The ODP funding that is available, is granted to states to increase state and local capability to respond to major disasters arising from terrorism events. 80% of the funding received by the state must be used to improve local capability in support of the Montana Homeland Security Strategic Plan. While this funding must go to increase the capability of local government, it does

not necessarily have to be sub-granted to counties. For example, the first year's grant funds were used to develop and equip regional hazmat teams across the state.

Obviously funding is a potential obstacle to a new system, both in terms of equipment acquisition and on going maintenance and perceptions of it. Most users were aware of the potential costs of a next-generation system and seemed skeptical of the value especially when the cost of the next-generation equipment is more expensive than the cost of wide band conventional equipment. This cost difference is shrinking as the technology lifecycle matures.

Every day support for interoperable communication is growing. There are articles in newspapers and on television, which in turn seem to launch bills in congress and local government to improve interoperable communications. The country is further recognizing the need and importance of emergency responders being able to communicate with each other.

There is concern throughout the consortium regarding how the available 2005 ODP funding will be allocated. This concern has presented itself with various agencies feeling that they have certain needs that need to be addressed before others in the consortium. This will need to be handled at the consortium board level and will not be easy to manage. Additional funding will make this easier to manage.

The consortium will need grant funds to replace equipment, but each jurisdiction should also develop capital improvement plans and set aside funds from various revenue sources, such as PILT, or general taxes. Local dollars may be needed to provide matching funds for grants or to fund items that a grant will not pay for, such as construction in the case of Homeland Security Grants.

### **5.6.2 Coverage Overview**

Coverage from the preliminary design looks very promising from a mobile unit standpoint. The preliminary design was developed to provide trunked mobile coverage across the entire region. The one area that has slightly less trunked coverage is in Teton County. This could be covered by upgrading the Seven Mile Hill site to a trunked site. Details of that upgrade will need to be determined in the design phase.

Other areas where coverage was described as being a problem seem to be improved based on the coverage maps provided. The reason for the improvement is the overlapping of different site coverage through a trunked system. This is still preliminary data and only a model. Detailed design work will confirm coverage.

Portable coverage was considered only in Great Falls. Other population centers were not looked at in detail due to limitations in availability of portable coverage maps. This will need to be looked at in the next phase as well.



### 5.6.3 Formal Communication Plans

To improve inter agency communications, it will be important for all agencies to establish formal communication plans. Almost all agencies have various neighboring law enforcement, fire and EMS frequencies programmed into their radios now. However, almost no one has a formal communication plan to be able to verify which frequencies have been programmed and which frequencies have not.

Local and inter-jurisdiction interoperable communications are dependant on each party having the other's frequencies programmed into their radios. This type of coordination is critical for everyone in a region to be able to communicate effectively. It is also important that the collaboration on frequencies be formally documented through a memorandum of understanding.

It is critical that local agencies work with DNRC and Forest Service to ensure that they have coordinated with the narrow band frequency migration that is underway. The CMICC should develop conventional frequency plans until a more advanced mechanism is available. This plan would include conventional frequencies and mutual aid channels.

This is a scenario that would benefit from a centralized information system, ideally a database. It should be accessible by each agency to coordinate frequencies and radio programming.

Initially, local agencies will need an individual who is responsible for:

- ensure radio frequencies are correctly programmed into radios
- ensure FCC licenses are kept current
- ensure radio sites are properly maintained
- research radio technology and recommend standards for radio purchases
- develop frequency plans
- review business practices to insure interoperability
- coordinate training for system users

The Consortium should work on developing a well-accepted communication channel plan for the conventional system as a preliminary step, while waiting to deploy a new system. Mutual Aid (State Color channels) is used for interoperability but these sometimes fall short because coverage is limited to simplex communications. Where the topography of the jurisdiction is better served by repeated channels a strategy to share repeaters during an emergency should be developed. Existing plans are limited to agencies within a jurisdiction, plans to provide interoperability across the consortium is needed.

Another area that will require formal communication plans will be with private ambulance companies. There are several operating in or near the consortium as well as around the state. A plan needs to be developed, potentially through DPHHS, on how to deal with that aspect of radio communication system.

#### **5.6.4 Business Process, Training and Dispatch**

Business process and dispatch process were identified by many stakeholders as a priority for a new communications system. As part of the implementation plan, the consortium should make sure that specific training is provided to all levels of radio users on:

- Radios
- Procedures
- Dispatch
- Trunking

Dispatch is a central aspect to radio communications and can be a bottleneck in communications when multiple incidents are being managed. This topic has been included in the process and training section as many of the problems that occur with dispatch can be addressed through business practices and training on those practices.

Dispatch can also benefit from the technology being proposed as has been demonstrated by the CDP1 project in Lewis and Clark County. By establishing business process such that tactical communication is handled on non-dispatch talkgroups, dispatch is freed up to focus on issues that require their attention. This is both a technological and procedural solution that will need to be worked in the following stages of this project.

#### **5.6.5 Centralized Project and Frequency Management**

It is recommended that the following phases of this project be managed through a centralized Project Management Office (PMO). It will be critical to clearly define the role and responsibilities for this entity.

Project management is key to ensuring that site selection and development serves multiple consortia. Centralized project management will provide cost containment and cooperation that will result in lower overall costs.

This PMO would be a logical location for frequency management issues.

#### **5.6.6 Board of Project Directors**

The Board is still defining their role as “directors” for the statewide effort. This role seems to be a logical place to formalize procedures on how all the consortia work together. Collaboration is the key to success and will maximize the benefits from dollars spent.

Project management is key to ensuring that site selection and development serves multiple consortia. Centralized project management will provide cost containment and cooperation that will result in lower overall costs.

The company providing project management would be a logical location for managing or coordinating frequency issues as well.

To improve inter agency communications, it will be important for all agencies to establish formal communication plans. Almost all agencies have various neighboring law enforcement, fire and EMS frequencies programmed into their radios now. However, almost no one has a formal communication plan to be able to verify which frequencies have been programmed and which frequencies have not.

### **5.6.7 Inventory Standards**

There is no standard in effect for inventory and most agencies do not maintain a formal inventory file. Most grants will require property management standards and records to be kept for verification. Property records should be centralized to the maximum extent possible along with finance records. A physical inventory should be taken bi-annually, on at least a random selection basis, to verify the equipment exists, what its current use is, and the need for the equipment. Control system(s) should be in place to prevent loss, damage, theft, etc. A method of tagging each item of equipment should be implemented.

Property records should be maintained to include the following equipment data:

1. Description (nomenclature)
2. Serial Number
3. Acquisition Date
4. Acquisition Cost
5. Source
6. Percentage of Federal Funds
7. Location use
8. Condition
9. Disposition Data (when taken out of service)
10. Sales Price
11. Fair Market Value

If a statewide equipment reallocation strategy were adopted, a full equipment inventory database would be the best solution. Other state agencies may have equipment-tracking databases that could be looked to for a model.

### **5.6.8 Pager Equipment and Systems**

Paging related issues accounted for 16% of what responders felt was an important communications improvement. Paging was not considered to be within the scope of work for interoperable communications so no preliminary design work was done in that area. The issue should be addressed in each jurisdiction and region to come up with specific improvements for those responders.

## 5.7 Preliminary Design

The system implementation will have to be taken in phases unless a significant revenue source is found. In order to allow for many funding sources, an overall implementation strategy has been devised. This strategy is broken down into two sections: field units and site development.

### **Phase 1:** Set the Stage - Radios and Site Upgrades

This stage of the project is to ensure that basic standards are met about site conditions and capabilities, which will make sites “microwave ready”. It is also the stage for upgrading certain radios, both repeaters and field units.

### **Phase 2:** Add Trunked Sites at each County Seat and Tribal Headquarters

The second stage adds microwave and trunking capabilities to sites overlooking counties seats, which are significant population centers, as well as dispatch centers.

### **Phase 3:** Upgrade Additional Sites to Trunking Where Needed

This stage is where the system will go if the consortium has the funding necessary to build out a system that will satisfy the needs of everyone involved.

### 5.7.1 Field Unit Upgrade Strategy

At the onset of the project, significant resistance to the entire project was based on concern over the costs for subscriber units. In several jurisdiction meetings, users brought up costs for new trunking subscriber units in the \$5000 range, compared to conventional pricing at less than \$1000. Since that time, vendor competition has increased, and thus the cost for subscriber units has come down considerably. This will continue, as has been the case with all new electronic equipment. At the time of this writing, a base subscriber unit that is trunking upgradeable can be purchased for less than \$1000. However, there are units with advanced features that can push the \$5000 range. It all depends on the features that are added to the unit.

The recommended strategy for upgrades to field units is based on the incident command structure. Since the initial funding source is requiring P25 Trunking capable units be purchased with grant funding, it is recommended that command and control level users be provided with new units first.

The following table lists category levels which radios fall into that will help explain the types of field units out there and how they can be upgraded and used based on the ICS system.

| Field Unit Level  | Description                     | Minimum Standard                                 |
|---|---------------------------------|--|
| <b>Category 1:</b> P25 -Trunking Capable  | P25 Trunking Capable            | Deploy based on the ICS Command Structure first, |
| <b>Category 2:</b> P25 Conventional (Existing)  | P25 Conventional (Non-Trunking) | <u>Phase out third</u>                           |
| <b>Category 3:</b> Newer -  | Narrow band conventional        | <u>Phase out second</u>                          |
| <b>Category 4:</b> Old  | Wide band conventional          | <u>Phase out first</u>                           |
| Encryption added to Category 1 Radios for ICS commanders and other users as decided at the consortium level – Encryption key(s) designated for statewide use carried in all radios. |                                 |  |

**Figure 46 – Field Unit Categories**

New radio equipment is Category 1 type the consortium will develop a deployment strategy based on the Incident Command Structure. The “Trickle Down Strategy”, or resource reallocation strategy, is used to re-deploy serviceable category 3 or 2 radios until all radios are a Category 3. This will help to ensure that all radios become narrow band in time for the changes that will be mandated by the FCC.

Specifically it is recommended that in the first stages of this project, fire remain as is, with the exception of command and control. This will continue until a complete system is operational or until the various agencies are interested in moving more quickly. The consortium needs to prioritize the remaining functional areas of law enforcement, EMS, DES and public works.

New mobiles/portable radios are required to meet the Category 1 standard.  
ICS Command structure determines sequence, Commanders should have encrypted radios.  
Encryption strategy determined at Project Directors level.

Existing Category 3 radios are redistributed to replace Category 4 radios until all Category 4 radios are out of service. Then category 3 is phased out and finally category 2 radios phased out.

Replacement strategy: Agency, discipline, jurisdiction, consortium, other consortiums.

*For example, Sheriff with category 3 radio passes this radio to replace a Category 4 radio and receives a new Category 1 radio.*

This “Trickle Down” strategy will allow radios to be redistributed and the first milestone to be achieved. This same strategy can be used with repeaters, base stations and even towers.

It would be beneficial to all to develop an approved equipment list based on the WSCA contract.



<http://www.aboutwsca.org/>

As a final note on field units: It is becoming increasingly clear that the 2013 date for all units to be narrow band is not the date to look at. As the Forest Service and DNRC upgrade radios to narrow band in the coming year, all agencies that interface with them will need to narrow band, preferably before the next fire season.

### 5.7.2 Site Upgrade Strategy

Replace or upgrade sites to a certain level of standard that would include:

- Proper grounding
- Tower structural integrity
- Backup power capabilities
- Building capacity and environmental

The following table lists each of the sites in the consortium and the general upgrade path for the site. Sites upgrade path is selected based on coverage, current fundamental site conditions: power, building, tower, etc. The goal is to select sites that can fit together in a trunked system with overlapping coverage. Other sites will remain conventional based on available funding. The upgrade plan incorporates adding repeaters to the existing CDP I system to improve coverage and interoperability in all counties in the consortium.

It is critical that this work be centralized through project and frequency management to ensure that what one consortium is building works with another consortium where possible. Centennial, Belgian Hill, Kings Hill and several other sites border, or reach well into other consortia. Other sites located in bordering consortia may very well allow for increased coverage into the CMICC region.

**Legend:**

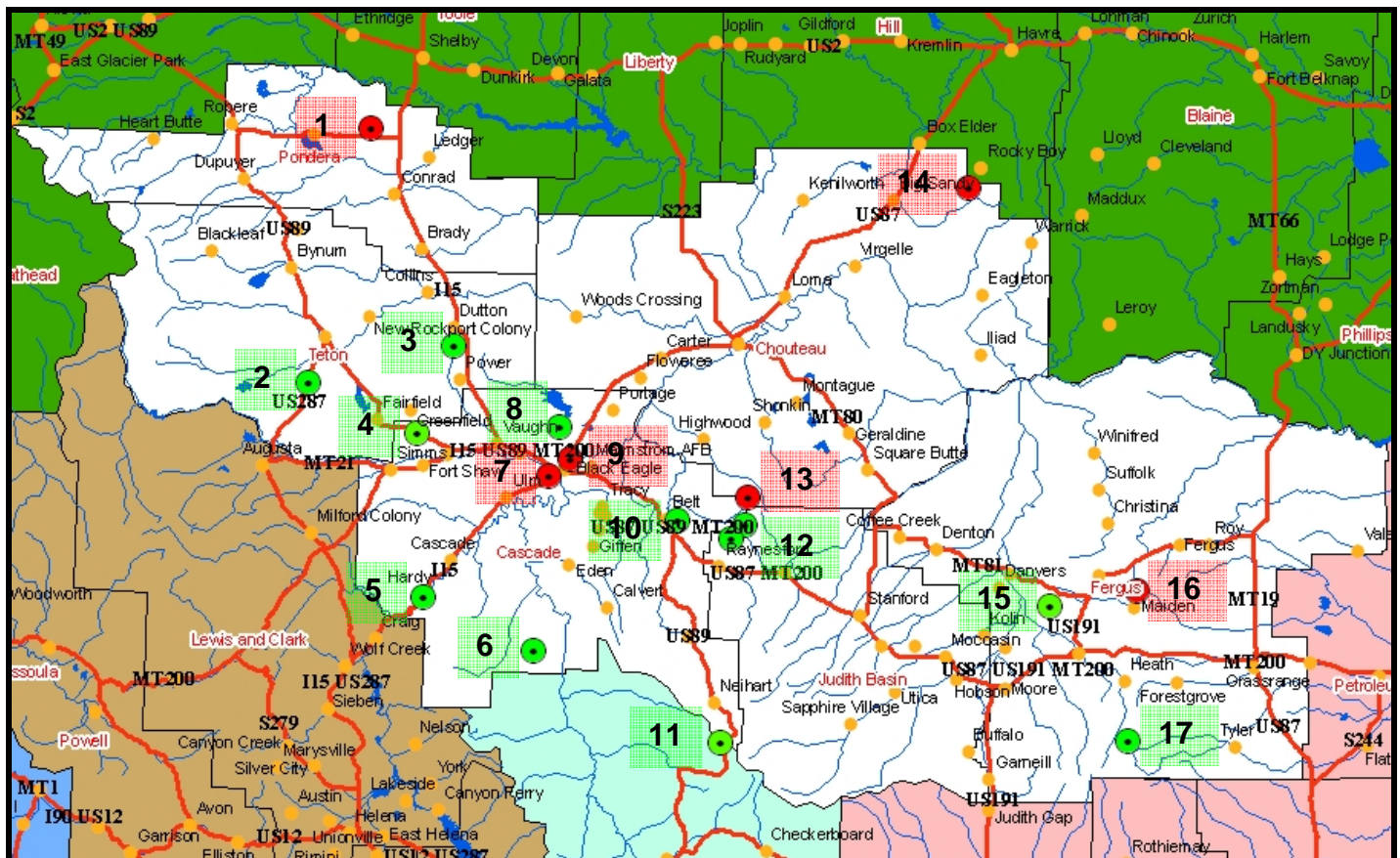
**Trunked Site:**



**Conventional Site:**



- |                                 |                                      |
|---------------------------------|--------------------------------------|
| 1 Belgian Hill                  | 10 Belt Butte                        |
| 2 Seven Mile Hill               | 11 King's Hill                       |
| 3 Teton Ridge                   | 12 Raynesford or South Peak Highwood |
| 4 Cascade West (or Shaw Butte)  | 13 Highwood Baldy                    |
| 5 Cascade South                 | 14 Centennial                        |
| 6 Milligan Hill                 | 15 South Moccasin                    |
| 7 Gore Hill (option of 2 sites) | 16 Judith Peak                       |
| 8 Cascade North                 | 17 Alaska Bench                      |
| 9 Black Eagle (new site)        |                                      |



**Figure 47 – CMICC Site Map**

The following table lists the sites to be utilized in the design process and comments relating to the architecture of the site or optional site locations.

| Sites         |  | Comments   |
|---------------|--|--|
| Cascade       | New Black Eagle Site                       | Trunked Site: If a new site is needed at Black Eagle, then Cascade North will remain as is.  |
|               | Cascade North                              | Keep Conventional - Leave this site as is  |
|               | Cascade South                              | Keep Conventional - Leave this site as is (walk in only)                                     |
|               | Kings Hill                                 | Keep Conventional - Upgrade infrastructure, possibly share costs with other consortia        |
|               | Millegan Hill                              | Keep Conventional - upgrade infrastructure   |
|               | Belt Butte                                 | Keep Conventional - upgrade infrastructure   |
|               | Gore Hill or 2nd Site For Great Falls      | Trunked Site: Possibly use Gore Hill site or find an alternate site for GF portable coverage |
|               | Cascade West/Shaw Butte                    | Keep Conventional - may move West to Shaw depending on coverage                              |
|               |  |  |
| Chouteau      | Centennial                                 | Trunked Site being developed by Northern Tier  |
|               | Highwood Baldy                             | Trunked Site: MHP going here, Northern Tier would like to be here.                           |
| Fergus        | Judith Peak                                | Trunked Site   |
|               | South Moccasin                             | Keep Conventional - Upgrade infrastructure   |
|               | Alaska Bench                               | Add Conventional Repeater  |
| Pondera       | Belgian Hill                               | Trunked Site   |
| Teton         | Seven Mile Hill                            | Keep Conventional - upgrade infrastructure   |
|               | Teton Ridge                                | Keep Conventional - upgrade infrastructure   |
| Judith Basin  | Raynesford                                 | Keep Conventional - evaluate if this site is needed with Highwood Baldy being trunked        |
|               | Stanford Repeater                          | Keep Conventional - upgrade infrastructure or move to cell site?                             |
| Northern Tier | Antoinne Butte, Mount Royal, Glacier Baldy | Add one trunked repeater to each of these sites  |

Figure 48 – CMICC Site List



### 5.7.3 Proposed System Coverage Maps

The following maps display several different coverage maps for the proposed system. The first map shows trunked coverage available to the CMICC from existing and planned sites for the Lewis and Clark County system and Northern Tier system. The second map shows proposed trunked coverage in the consortium and the last map includes conventional fill in coverage.

#### Legend:

Trunked Site:



Conventional Site:



CMICC Trunked Coverage

CMICC Conventional Fill In Coverage

NTIC Trunked Coverage

Lewis and Clark Co. Trunked Coverage

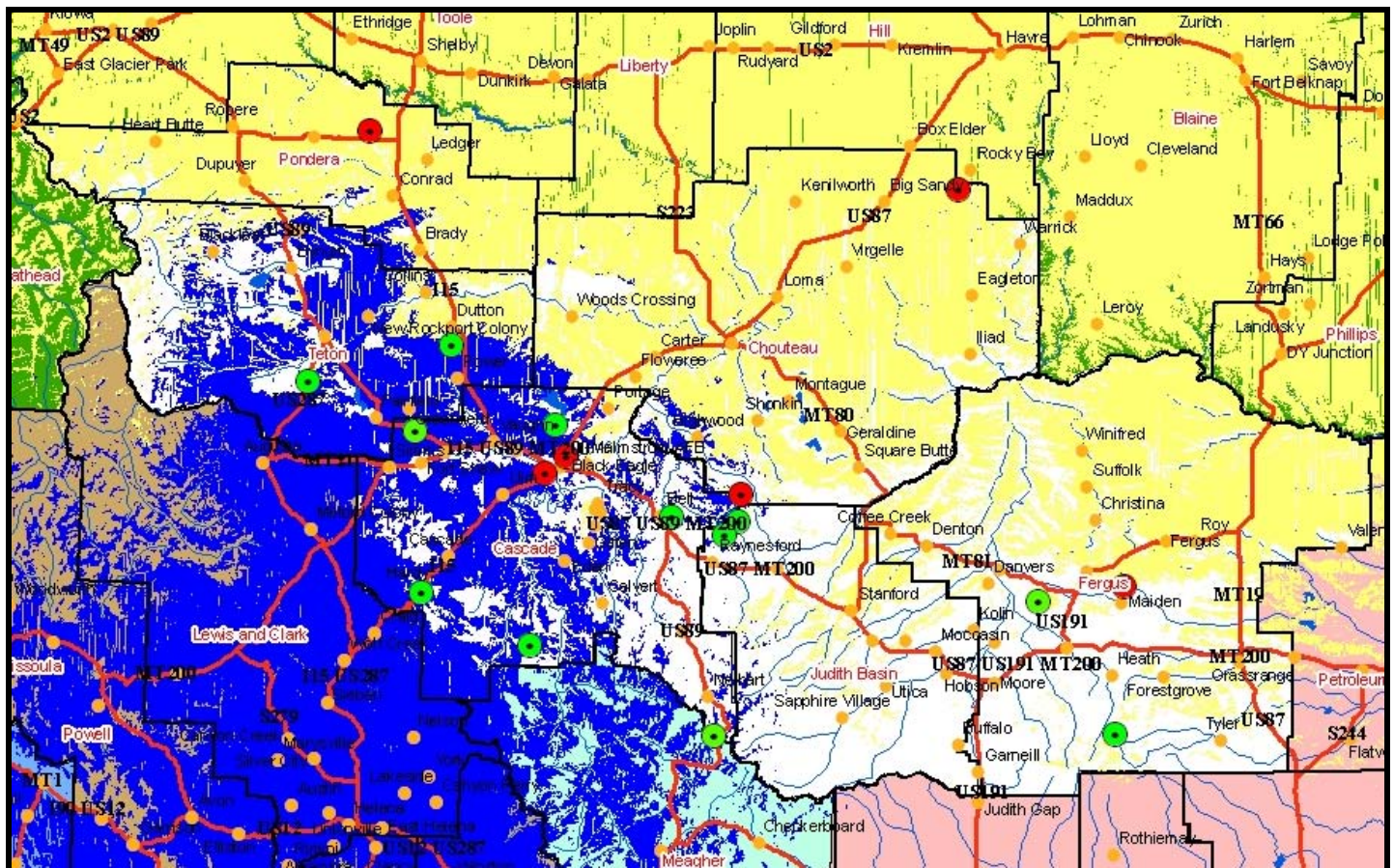
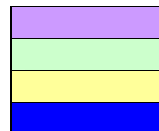


Figure 49 – Northern Tier + Lewis and Clark County Coverage



This map displays trunked coverage from Lewis and Clark County, the Northern Tier and proposed trunked coverage from CMICC.

**Legend:**

**Trunked Site:**

### Conventional Site:

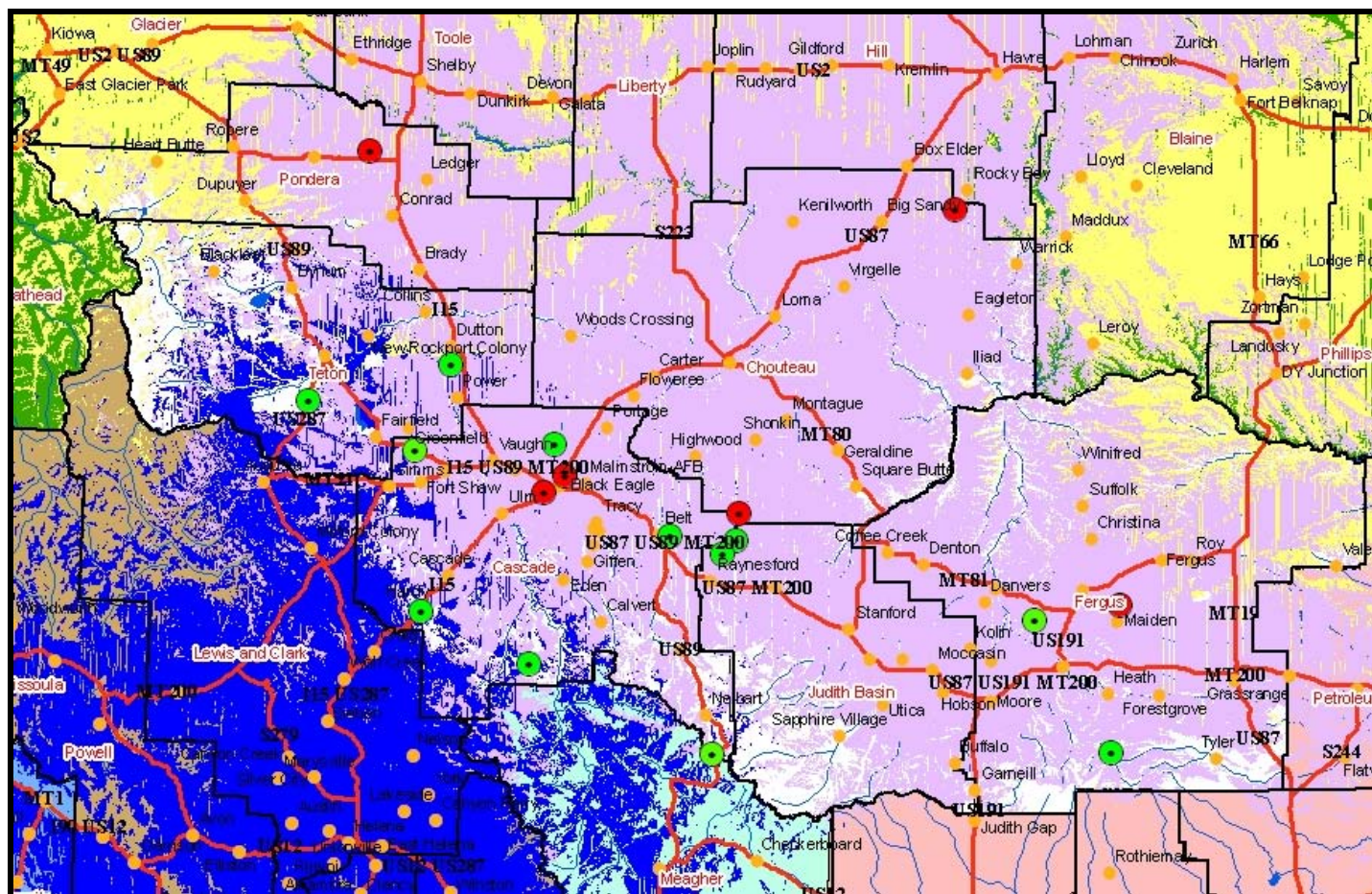


## CMICC Trunked Coverage

### CMICC Conventional Fill In Coverage

### NTIC Trunked Coverage

## Lewis and Clark Co. Trunked Coverage



### Figure 50 – CMICC Planned Trunked Coverage



This map displays trunked coverage from Lewis and Clark County, the Northern Tier and proposed trunked coverage from CMICC as well as additional conventional fill in coverage from CMICC sites.

**Legend:**

**Trunked Site:**



**Conventional Site:**

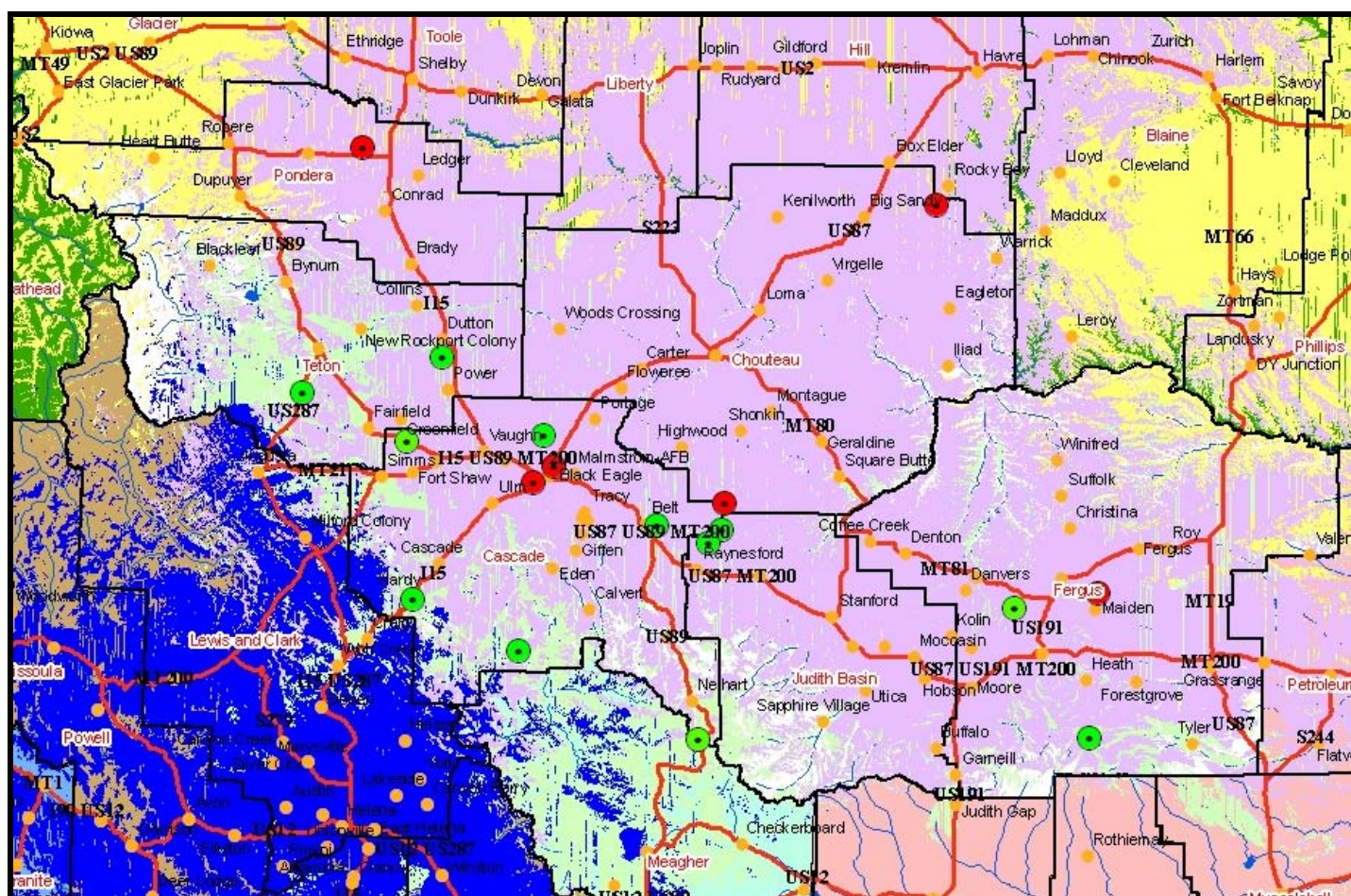
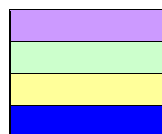


**CMICC Trunked Coverage**

**CMICC Conventional Fill In Coverage**

**NTIC Trunked Coverage**

**Lewis and Clark Co. Trunked Coverage**



**Figure 51 – CMICC Planned Sites Trunked and Conventional Fill-in Coverage**

## 5.7.4 Site Development Cost Estimate

The following data is also contained in a spreadsheet in Appendix A

### **Alaska Bench:** Add Conventional Repeater

|                            |                 |
|----------------------------|-----------------|
| 1 Quantar                  | \$20,000        |
| Connect to trunked system: | \$11,000        |
| <b>Total:</b>              | <b>\$31,000</b> |

### **Belgian Hill:** Trunked Site

|                          |                  |
|--------------------------|------------------|
| Grounding                | \$10,000         |
| Building                 | \$25,000         |
| Tower                    | \$160,000        |
| 3 Quantars               | \$60,000         |
| Microwave                | \$85,000         |
| Site controller/combiner | \$46,000         |
| Trunking upgrade         | \$90,000         |
| <b>Total:</b>            | <b>\$476,000</b> |

### **Belt Butte:** Keep Conventional - upgrade infrastructure

|                           |                  |
|---------------------------|------------------|
| Grounding                 | \$10,000         |
| Building                  | \$25,000         |
| Tower                     | \$50,000         |
| Generator                 | \$10,000         |
| 1 Quantar                 | \$20,000         |
| Connect to trunked system | \$11,000         |
| <b>Total:</b>             | <b>\$126,000</b> |

### **Black Eagle:** New Trunked Site: If a new site is needed at Black Eagle, then Cascade North will remain as is.

|                          |                  |
|--------------------------|------------------|
| Grounding                | \$10,000         |
| Building                 | \$25,000         |
| Tower                    | \$160,000        |
| Generator                | \$10,000         |
| 5 Quantars               | \$100,000        |
| Microwave                | \$85,000         |
| Site controller/combiner | \$46,000         |
| Trunking upgrade         | \$150,000        |
| <b>Total:</b>            | <b>\$586,000</b> |

### **Cascade North:** Keep Conventional - Leave this site as is

|                           |                 |
|---------------------------|-----------------|
| Connect to trunked system | \$11,000        |
| <b>Total:</b>             | <b>\$11,000</b> |

**Cascade South:** Keep Conventional - Leave this site as is (walk in only)

|                                  |                 |
|----------------------------------|-----------------|
| 1 Quantar                        | \$20,000        |
| <u>Connect to trunked system</u> | <u>\$11,000</u> |
| <b>Total:</b>                    | <b>\$31,000</b> |

**Cascade West/Shaw Butte:** Keep Conventional - may move West to Shaw depending on coverage

|                                  |                  |
|----------------------------------|------------------|
| Grounding                        | \$10,000         |
| Building                         | \$25,000         |
| Tower                            | \$50,000         |
| Generator                        | \$10,000         |
| 1 Quantar                        | \$20,000         |
| <u>Connect to trunked system</u> | <u>\$11,000</u>  |
| <b>Total:</b>                    | <b>\$126,000</b> |

**Centennial:** Trunked Site being developed by Northern Tier (add two repeaters)

|                         |                  |
|-------------------------|------------------|
| 2 Quantars              | \$40,000         |
| <u>Trunking upgrade</u> | <u>\$60,000</u>  |
| <b>Total:</b>           | <b>\$100,000</b> |

**Gore Hill:** or 2nd Site For Great Falls Trunked Site

|                          |                  |
|--------------------------|------------------|
| Grounding                | \$10,000         |
| Building                 | \$25,000         |
| Tower                    | \$160,000        |
| Generator                | \$10,000         |
| 5 Quantars               | \$100,000        |
| Site controller/combiner | \$46,000         |
| <u>Trunking upgrade</u>  | <u>\$150,000</u> |
| <b>Total:</b>            | <b>\$501,000</b> |

**Highwood Baldy:** Trunked Site: MHP and Northern Tier would like to be here.

|                          |                  |
|--------------------------|------------------|
| 3 Quantars               | \$60,000         |
| Microwave                | \$85,000         |
| Site controller/combiner | \$46,000         |
| <u>Trunking upgrade</u>  | <u>\$90,000</u>  |
| <b>Total:</b>            | <b>\$281,000</b> |

**Judith Peak:** Trunked Site

|           |           |
|-----------|-----------|
| Grounding | \$10,000  |
| Building  | \$25,000  |
| Tower     | \$160,000 |
| Generator | \$10,000  |

|                          |                  |
|--------------------------|------------------|
| 3 Quantars               | \$60,000         |
| Microwave                | \$85,000         |
| Site controller/combiner | \$46,000         |
| <u>Trunking upgrade</u>  | <u>\$90,000</u>  |
| <b>Total:</b>            | <b>\$486,000</b> |

**Kings Hill:** Keep Conventional - Upgrade infrastructure, possibly share costs with other consortia

|                                  |                  |
|----------------------------------|------------------|
| Grounding                        | \$10,000         |
| Building                         | \$25,000         |
| Tower                            | \$160,000        |
| Generator                        | \$10,000         |
| 1 Quantar                        | \$20,000         |
| <u>Connect to trunked system</u> | <u>\$11,000</u>  |
| <b>Total:</b>                    | <b>\$236,000</b> |

**Millegan Hill:** Keep Conventional - upgrade infrastructure

|                                  |                  |
|----------------------------------|------------------|
| Grounding                        | \$10,000         |
| Building                         | \$25,000         |
| Tower                            | \$50,000         |
| Generator                        | \$10,000         |
| 1 Quantar                        | \$20,000         |
| <u>Connect to trunked system</u> | <u>\$11,000</u>  |
| <b>Total:</b>                    | <b>\$126,000</b> |

**Raynesford:** Keep Conventional - evaluate if this site is needed with Highwood Baldy being trunked

|                  |                  |
|------------------|------------------|
| Grounding        | \$10,000         |
| Building         | \$25,000         |
| Tower            | \$160,000        |
| Generator        | \$10,000         |
| <u>1 Quantar</u> | <u>\$11,000</u>  |
| <b>Total:</b>    | <b>\$216,000</b> |

**Seven Mile Hill:** Keep Conventional - upgrade infrastructure

|                                  |                  |
|----------------------------------|------------------|
| Grounding                        | \$10,000         |
| Building                         | \$25,000         |
| Tower                            | \$160,000        |
| Generator                        | \$10,000         |
| <u>Connect to trunked system</u> | <u>\$11,000</u>  |
| <b>Total:</b>                    | <b>\$216,000</b> |

**South Moccasin** Keep Conventional - Upgrade infrastructure



|                           |                  |
|---------------------------|------------------|
| Grounding                 | \$10,000         |
| Building                  | \$25,000         |
| Tower                     | \$160,000        |
| Generator                 | \$10,000         |
| 3 Quantars                | \$60,000         |
| Connect to trunked system | \$11,000         |
| <b>Total:</b>             | <b>\$276,000</b> |

**Stanford Repeater:** Keep Conventional - upgrade infrastructure or move to cell site

|                           |                  |
|---------------------------|------------------|
| Grounding                 | \$10,000         |
| Building                  | \$25,000         |
| Tower                     | \$50,000         |
| Generator                 | \$10,000         |
| 1 Quantar                 | \$20,000         |
| Connect to trunked system | \$11,000         |
| <b>Total:</b>             | <b>\$126,000</b> |

**Teton Ridge:** Keep Conventional - upgrade infrastructure

|                           |                  |
|---------------------------|------------------|
| Grounding                 | \$10,000         |
| Building                  | \$25,000         |
| Tower                     | \$160,000        |
| Generator                 | \$10,000         |
| Connect to trunked system | \$11,000         |
| <b>Total:</b>             | <b>\$216,000</b> |

**Northern Tier Sites:**

Add repeaters at:

Antoinne Butte  
Mount Royal  
Glacier Baldy

|                   |                  |
|-------------------|------------------|
| 3 Quantars        | \$60,000         |
| Trunking upgrades | \$90,000         |
| <b>Total:</b>     | <b>\$150,000</b> |

|                                     |                    |
|-------------------------------------|--------------------|
| <b>Site Upgrade Sub-total</b>       | <b>\$4,317,000</b> |
| Dispatch Center Upgrades            | \$136,000          |
| Project Management – Site Buildout  | \$445,300          |
| <b>Total Site Development Costs</b> | <b>\$4,898,000</b> |

**Figure 52 – CMICC Infrastructure Cost**



### 5.7.5 Subscriber Unit Cost Considerations

The following table lists three options for the consortium to consider in regard to the upgrade of subscriber units throughout the consortium. Option 1 is takes a minimalist approach and would distribute new P25 trunking capable radios to the command level users as explained in the strategy section. Option 2 would be a middle level option that would allow all radios in the consortium to be narrowbanded and upgrade roughly two thirds of the radios in the consortium. Finally Option 3 would allow every user in the consortium to have P25 trunking capable radios.

See the spreadsheet in Appendix B for details on this cost analysis.

|                         |  |                    |
|-------------------------|--|--------------------|
| <b><u>Option 1:</u></b> | Replace minimum “command” level radios   | <b>\$560,000</b>   |
| <b><u>Option 2:</u></b> | Replace all “Category 4” and “unknown” radios with new (allows for narrow banding) | <b>\$3,478,000</b> |
| <b><u>Option 3:</u></b> | Replace all radios with new  | <b>\$6,058,000</b> |

**Figure 53 – CMICC Radio Cost Options**

### 5.7.6 Assumptions and Caveats

1. It is assumed that all counties will want to keep their existing equipment and frequencies. As a result, this preliminary design assumes new equipment for the P25, trunked system.
2. The assumption was made to use existing sites, towers, and buildings whenever possible. In order to come up with a worst-case scenario from a costing perspective, those sites deemed incapable assume erecting a new tower and building at each site, unless indicated otherwise in the detail for each site.
3. Costs for renting land or towers are not included in the estimate.
4. The individual estimated costs used to derive the site estimates are as follows:

| Estimated Pricing |   |
|-------------------|---|
| \$10,000          | Generator   |
| \$10,000          | Grounding   |
| \$25,000          | Building  |
| \$160,000         | Tower - 100 ft  |
| \$50,000          | Tower - 30 ft   |
| \$20,000          | P25 Trunk CAPABLE Repeater and Antenna                                    |
| \$30,000          | Add trunking to site with existing trunk capable repeaters (per repeater) |
| \$6,000           | Site controller   |
| \$85,000          | Microwave - 1 hop   |
| \$40,000          | Combiner equipment  |
| \$11,000          | Connect to Trunked System   |
| \$8,000           | Consollette Base Station  |
| \$2,000           | Dispatch Trunking Upgrade   |
| \$2,000           | Frequency Acquisition - Per Pair  |

**Figure 54 – Equipment Pricing List**

## 5.8 Letters of Support

Letters of support for the efforts and goals of the consortium were received from the following stakeholders:

- Cascade County Board of County Commissioners
- City of Great Falls
- Great Falls Police Department
- Cascade County Sheriff's Office
- Cascade County Disaster and Emergency Services
- Conrad Fire Department
- Valier Fire Department
- Conrad City Police
- Pondera County Sheriff's Office
- Town of Valier
- City of Conrad
- Pondera County Emergency Medical Services
- Pondera County Commissioners
- Pondera County Search and Rescue
- Dupuyer Fire Department
- Fergus County Local Emergency Planning Committee
- Cheadle Volunteer Fire Department
- Lewistown Fire-Rescue
- Fergus County Disaster and Emergency Services

- Lewistown Police Department
- Central Montana 911 Center
- Fergus County Sheriff's Department
- Fergus County Commission

## 5.9 Risks

- Lack of funding
- Lack of stakeholder buy-in and commitment

These two factors are the major obstacles to the project. Funding is the key to the project. The Homeland Security Grants are the primary source of funding, but other sources of funding need to be found.

Lack of stakeholder buy in is not a significant problem, but it has the potential for high impact if it were to wane. In the early stages of this phase of the project, there was significant resistance to the idea of a statewide, digital trunked system. Since that time, many stakeholders have gained a better understanding of the technology and how it affects them. In addition, the strategy described in this document is based exactly on the concerns from those stakeholders. This has helped to increase stakeholder buy-in.

Keeping the momentum and maintaining the level of interest that has been developed over the past several months is important. This can be done through demonstrated success, small wins, throughout the project.

Some degree of autonomy is relinquished when a shared communications system is implemented. There may be times when parochial interests become an obstacle to establishing a shared system, particularly when it comes to funding. The system will only be as good as the extent of its acceptance. To ensure continued communication among all users, a good strategy would be to encourage participation through local groups like a radio steering committee or the Interoperable Project Technical Committee.

## 5.10 Next Steps

Prior to moving on to the design and implementation phase, it is critical that detailed information be gathered in regard to subscriber units, sites, frequencies and exactly what is in use at each site. Recent information regarding operational aspects of dispatch centers indicates further research into upgrade paths for dispatch is necessary. Information that is more detailed will ensure that good decisions are made, and ultimately that funding is used as effectively as possible.

### **Subscriber Units**

There are still quite a few subscriber units listed in the “unknown” category. It is very possible that there are newer radios that do not need replacing in this category. That will ultimately save money.

### **Site Surveys**

Completing site surveys at the engineering level is beyond the scope of the baseline needs assessment. Sites were surveyed for obvious problems and basic details. Where available, photos of each site are located on the CD that accompanies this report. Site assessment criteria will have to be developed during the implementation phase but would include some generally applicable and logical considerations:

1. Topography as it relates to transmission efficiency
2. Road access as it relates to equipment needed for site upgrade/improvement
3. Electric power requirements for upgraded sites
4. R-56 or other grounding standards
5. Microwave link capability
6. Screening potential of existing vegetation, structures and topographic features
7. Compatibility with adjacent land uses
8. The least number of sites to cover the desired area
9. The greatest amount of coverage, consistent with physical requirements
10. Opportunities to mitigate possible visual impact

### **Dispatch Centers**

Dispatch centers will also require further investigation in regard to radio consoles and base station connectivity to the overall radio system. PSAPs and 911 centers were not part of this scope of work but will need to be integrated into the overall dispatch upgrade plan.

## **5.11 Contents of CD – Electronic Documents**

- Electronic version of this document
- Radio Inventory Spreadsheet
- Infrastructure Preliminary Design Spreadsheet
- Site Surveys
- Motorola Coverage Maps – Images
- Motorola Coverage Maps – GIS Data
- Site Photos
- Meeting Notes
- Completed Questionnaires
- Project Statement of Work Document
- SIEC Interoperable Definition



## **6 Appendices**

***Appendix A – Workplan Gap Analysis Spreadsheets***

***Appendix B – Radio Inventory Summary***

***Appendix C – Site Surveys***

***Appendix D – FCC License Information***

***Appendix E – Letters of Support***

***Appendix F – Questionnaire Results***

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